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Statistics for Community Governance: The Yawuru Indigenous Population Survey, Western Australia

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Abstract
This article presents a case study of an exercise in Aboriginal community governance in Australia. It sets out the background events that led the Yawuru Native Title Holders Aboriginal Corporation in the town of Broome on Australia's northwest coast to secure information for its own needs as an act of self-determination and essential governance, and it presents some of the key findings from that exercise. As the Indigenous rights agenda shifts from the pursuit of restitution to the management and implementation of benefits, those with proprietary rights are finding it increasingly necessary to build internal capacity for post-native title governance and community planning, including in the area of information retrieval and application. As an incorporated land-holding group, the Yawuru people of Broome are amongst the first in Australia to move in this area of information gathering, certainly in terms of the degree of local control, participation, and conceptual thinking around the logistics and rationale for such an exercise. An innovative addition has been the incorporation of survey output data into a Geographic Information System to provide for spatial analysis and a decision support mechanism for local community planning. In launching and administering the "Knowing our Community" household survey in Broome, the Yawuru have set a precedent in the acquisition and application of demographic information for internal planning and community development in the post-native title determination era.

Keywords
Indigenous population survey, demography, census, community development

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A significant irony is emerging in regard to the collection of social statistics on Indigenous peoples in Australia, and no doubt elsewhere around the world as well. At no time has there been such a volume and range of data on something called "the Indigenous population", mostly as a consequence of efforts by the Australian Bureau of Statistics (ABS, 2007), and yet there remains a dearth of information on the various sociocultural entities that make up that population (Taylor, 2009, 2011). As a consequence, in matters that are crucial to the interests of variously constituted Indigenous polities, we are increasingly information rich but invariably knowledge poor. So much so, in fact, that Peter Yu (2011), a prominent Australian Aboriginal (and Yawuru) leader, has commented:

> The view I have about data is a long way from the current paradigm where data is collected on Indigenous society by governments for their purposes, not to support the objectives that Indigenous people want to determine. I share a pervasive Indigenous aversion to the way data is collected by governments, academics or professional researchers on or about Aboriginal people … despite the wealth of empirical data dished up by countless inquiries, Royal Commissions and research projects over many decades about the social and economic condition of Aboriginal society, little practical benefit seems to come from all this data. Th[e] categories are constructed in the imagination of the Australian nation state. They are not geographic, social or cultural spaces that have relevance to Aboriginal people. (p. 1)

This article presents a case study of an attempt to reverse this paradigm. It sets out the background events that led the Yawuru Native Title Holders Aboriginal Corporation[1] through its development company (Nyamba Buru Yawuru [NBY]) to address its own demographic information needs as an act of self-determination and essential community governance via a comprehensive survey of Indigenous households in the town of Broome on Australia's northwest coast. An important and innovative feature of this exercise has been the incorporation of the resulting survey data into a Geographic Information System (GIS) that provides NBY with a capacity to identify and approach community-planning issues from an added spatial perspective.

As the Indigenous rights agenda gradually shifts from the pursuit of restitution to the management and implementation of benefits, those with inherent and proprietary rights are finding it increasingly necessary to build internal capacity for community planning including in the area of information retrieval and application in a post-native title determination society. As an incorporated landholding group, the Yawuru people of Broome are amongst the first in Australia to be active in this area—in terms of their degree of local control, participation, and conceptual thinking around the logistics and rationale for such an exercise. In launching the Yawuru Knowing our Community (YKC) household survey in Broome in 2011, it is fair to say that the Yawuru set a precedent in the acquisition of vital information by insisting that this be to serve their internal purposes as well as to enable representation of their own

[1] Native title comprises the rights and interests of Australian Indigenous peoples in their traditional lands and waters, which for each group derive from their own laws and customs and which are recognised by the Federal Court, in accordance with Australian statutory and common law, though subject to a judicial process of application by prospective Native Title holders. If determined to exist, this title is held in trust by a Prescribed Body Corporate as per the requirements of the Native Title Act (1993).

priorities and circumstances to the outside world. In effect, new governance arrangements in the post-native title determination era should inevitably be informed by locally controlled and customised information. In many ways, this represents a next step development of participatory and collaborative research efforts that have sought to merge Western research methodologies with Indigenous priorities and categories (Coombes, Johnson, & Howitt, 2013; Kukutai & Taylor, 2013). This article provides a case study example of how this can be done.

Native Title and Statistics in Broome

The determination of native title rights in and around the fast-growing town of Broome produced an unparalleled agreement between a Native title holding group and a government in Australia. In August 2010, the Yawuru Area Global Agreement[2] was registered as a formal resolution to issues arising out of the Rubibi 6 (2001) and Rubibi Community (2006) Native title claims, thereby finalising a 16-year process of Native title claim preparation, mediation, bitter litigation, and successful negotiation by Yawuru Native titleholders. This settlement of Yawuru Native title lands was signed by the Shire of Broome, the State of Western Australia, Yawuru Native Title Holders Aboriginal Corporation (as the Registered Native Title Body Corporate), and its commercial and management arm (NBY). Valued at almost $200 million as a combined land and financial package, the Global Agreement, in the form of two Indigenous Land Use Agreements (ILUAs), secures Yawuru as a prime equity partner in Broome's economy and in its conservation management and social development. The Agreement sets aside $20 million for social and affordable housing in recognition of the priority with which Yawuru treat the matter of adequate housing for Aboriginal people in Broome. The agreement also resolved heritage issues affecting land required for future development in and around Broome and it now makes land available for the development of residential and industrial areas, for tourism, and for future airport development.

While benefits to the Yawuru people included monetary payments for capacity building, preservation of culture and heritage, economic development, social housing, and joint management of a proposed conservation estate, these payments were scheduled up to and including the 2013 to 2014 financial year, thereby creating a very tight timeframe for crucial decision-making. Yawuru were mindful that this funding is miniscule compared to their pressing and growing needs and that it must be invested strategically. Clear measures of the scale and composition of these needs were urgently required to establish a sound information base for use in negotiations and planning with both public and private investors. In order to develop this capacity, NBY immediately searched for available statistical data on basic matters such as the size and socioeconomic condition of its client population, especially in regard to social housing. While such information was notionally available from the ABS and government agencies, the data were considered unreliable by NBY and, in any case, they provided no reference to a specifically Yawuru population. Accordingly, NBY itself decided to undertake a comprehensive household survey of the Aboriginal and Torres Strait Islander population of Broome, many of whom it

[2] Yawuru use the term "Global Agreement" to describe the Yawuru Native Title Agreement, rather than a settlement, which it clearly is not, nor a "comprehensive agreement". Yawuru avoid using the term "comprehensive agreement" so as not to compare the Yawuru Agreement with Canadian comprehensive agreements between the Canadian nation state and First Nations and Inuit peoples, which have the support of constitutional recognition, legislation, and established public policy in Canada.

knew would be Yawuru. While the original intent was to also include the many Yawuru people who live in other towns such as Port Hedland, Derby, Darwin, and Perth - some of whom may consider returning to live in Broome at a future point in time - this group did not form part of the present survey. Plans for counting the diaspora are to be included in future survey work.

In February 2011, NBY contracted a local Aboriginal body, the Kimberley Institute (KI) to project manage the survey. Its role was to design and conduct what became labelled as the Yawuru Knowing our Community (YKC) survey. The intention was to approach every Indigenous household in private dwellings in Broome, as well as all other Indigenous persons in Broome located in either non-private dwellings or homeless, as far as these could be ascertained on the basis of collective local knowledge. In turn, KI commissioned the Centre for Aboriginal Economic Policy Research (CAEPR) at the Australian National University (ANU) to assist by providing advice on the conduct of a survey and by offering training and skills transfer to local survey personnel, including in data analysis and report writing.

The YKC survey was conducted between April and July of 2011. It engaged a total of 997 Indigenous households in private dwellings in the Broome area. Of these, 928 (93%) participated in the survey and 69 (7%) declined the offer. As for people resident in non-private dwellings or homeless, the survey contacted a total of 249 individuals in various institutions and at camping sites (rudimentary shelters) around the town.

This survey was unique in many ways. It was not the first survey of Indigenous households ever to be conducted in an urban centre, not least in Broome. It was, however, the first survey to be knowingly comprehensive in coverage and to be developed, managed, conducted, and controlled entirely by local Indigenous organisations and local Indigenous residents for the primary purpose of informing their own local planning needs. While non-Indigenous personnel from the ANU assisted in a supporting role, the exercise itself can be described as the first truly Indigenous social survey in Australia on a whole-of-population scale. Though funding for the survey was partly sourced externally (from government), this support was only received on the understanding that the survey process and resulting data would be owned and controlled by NBY.

Conceptually, the collection of demographic, social, and economic information relating to the Indigenous peoples of Broome was designed to establish an evidence base that would enable Yawuru to embark on a logical sequence of social and economic planning. This emphasis on evidence-based planning underlined an urgent need for accurate demographic data, not least because there are no official data available for the Yawuru population group or social collective. As we have seen, from a Yawuru perspective, the data that purported to represent the Indigenous population of Broome was determined by them to be inadequate for their purposes because the categories are constructed in the imagination of the Australian nation state and are not for geographic, social, or cultural spaces that have relevance to Aboriginal people (Yu, 2011). This was a significant shortcoming for meaningful community planning because whatever the detail of local plans might be, it is crucial that they are based on reliable estimates for target groups such that statistical events in the population (for example, employment numbers, school enrolments, housing conditions, hospital separations, etc.) are drawn from the same population universe. Unfortunately, in official statistics on Indigenous populations this concordance is never certain.

From the outset then, Yawuru required the construction of a baseline unit-record demographic database that would be compiled and controlled locally and validated using local knowledge to ensure complete population coverage against categories that suited the needs of local planning goals. With such a baseline database in place, NBY would be in a position to identify the scale and composition of various courses of action that it might wish to pursue in order to achieve specified goals. It would also be in a position to monitor change over time and measure the degree to which planned outcomes matched actual outcomes at future dates, an important capacity to acquire in such a dynamic region as the West Kimberley. The sequence of steps involved in this process is illustrated in Figure 1 and within this schema the YKC survey is effectively step 2.

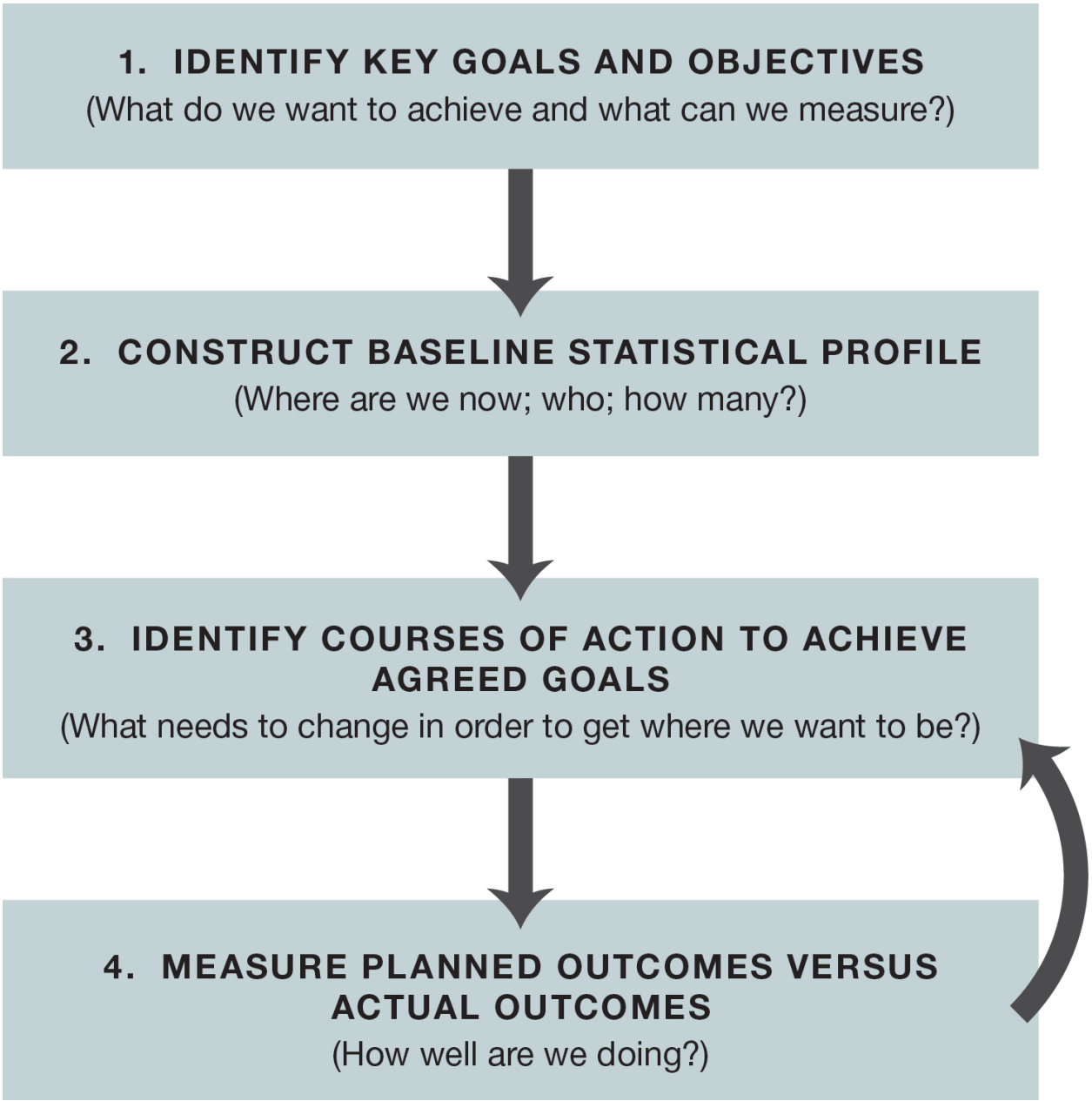

Figure 1. NBY Community Planning Sequence

The idea of conducting a household survey of Yawuru and other Indigenous households in Broome thus emerged alongside a growing realisation that the successful negotiation of Yawuru Native title rights brought with it a set of responsibilities that required Yawuru to develop a rigorous evidence base for its own purposes. This would provide for the rational economic and social use of its freehold and leasehold land for the benefit of Yawuru people and for generating a vision of sustainable and inclusive development for the whole of Broome, including for non-Yawuru. By the time the ILUAs were formally registered in August 2010, discussion and planning for the development of a population survey was already well underway, partly because of the NBY financial obligation to immediately prepare a number of management plans, especially in regard to social and affordable housing.

Methodology

In September 2010, the NBY Board resolved to undertake a comprehensive population survey of Broome to inform the Board's investment strategy, particularly in relation to social and affordable housing. A two-day workshop was conducted to explore options in December 2010. This involved Yawuru leaders, NBY staff, KI, ANU, the Australian Institute of Aboriginal and Torres Strait Islander Studies, and the Nulungu Research Institute at the University of Notre Dame Australia (Broome campus). This workshop focused on lessons learnt from previous dedicated surveys of Indigenous communities and on the logistics of conducting a Broome-specific survey. The workshop agreed on the broad objectives for such a survey and on an appropriate methodology; it also developed a budget mostly for hiring local people to form an interview team. Fundamentally, the workshop agreed on the following objectives and methodological principles for the survey:

- The overriding objective was to establish a comprehensive demographic database for the Indigenous population of Broome.
- There would be a critical focus on ascertaining community views on housing issues as a Yawuru priority.
- Other data that Yawuru require (e.g., employment, education and training, health, cultural attachment) would be obtained via subsequent sample surveys that would be enabled by the creation of the comprehensive dwelling and population list.
- Accuracy and efficiency would be ensured by applying local knowledge through the employment of an Aboriginal survey team from the Broome community.

With funding secured from federal and state government agencies, the first step in project management was the recruitment of some 20 local Aboriginal people, including highly skilled team coordinators and data managers, to undertake the survey. Those recruited were, as far as possible, representative of Broome Aboriginal society in terms of their cultural identity, age, and gender (Figure 2) and their first activity was to participate in a survey development and training workshop, which resulted in the production of the household questionnaire, a complete residential mapping of all Indigenous dwellings based on local knowledge, and a strategy for systematically conducting the survey across the various town neighbourhoods and in surrounding rural areas. In constructing the questionnaire, the group was conscious of a need to apply standard ABS questions and concepts where possible in order to maintain

comparability with official statistical collections. This was especially so in defining usual residents and visitors, although some modification to usual residence rules was allowed in order to represent what became referred to as "absent residents". The process of developing these outcomes was entirely interactive and determined by group consensus, an approach that gave the survey team substantive ownership of the survey methodology.

Figure 2. YKC Survey Team

An important mechanism to support enumerators and NBY in their approach to households was the development of a comprehensive communication strategy. This included the adoption of a survey logo for use on publicity posters located in shopping centres, offices, and public places (Figure 3). It also appeared on team uniforms and on the side of a survey team bus that transported interviewers during the daily round of their activities. Alongside this street-level publicity, a local Indigenous company, Goolarri Media Enterprises, produced three promotional videos that were broadcast before, during, and at the end of the survey on their locally-broadcast Goolarri TV. These promotional videos featured survey team members and Yawuru leaders in explaining the reasons for the survey, the manner in which it was to be conducted, and how the information that it collected would subsequently be used.

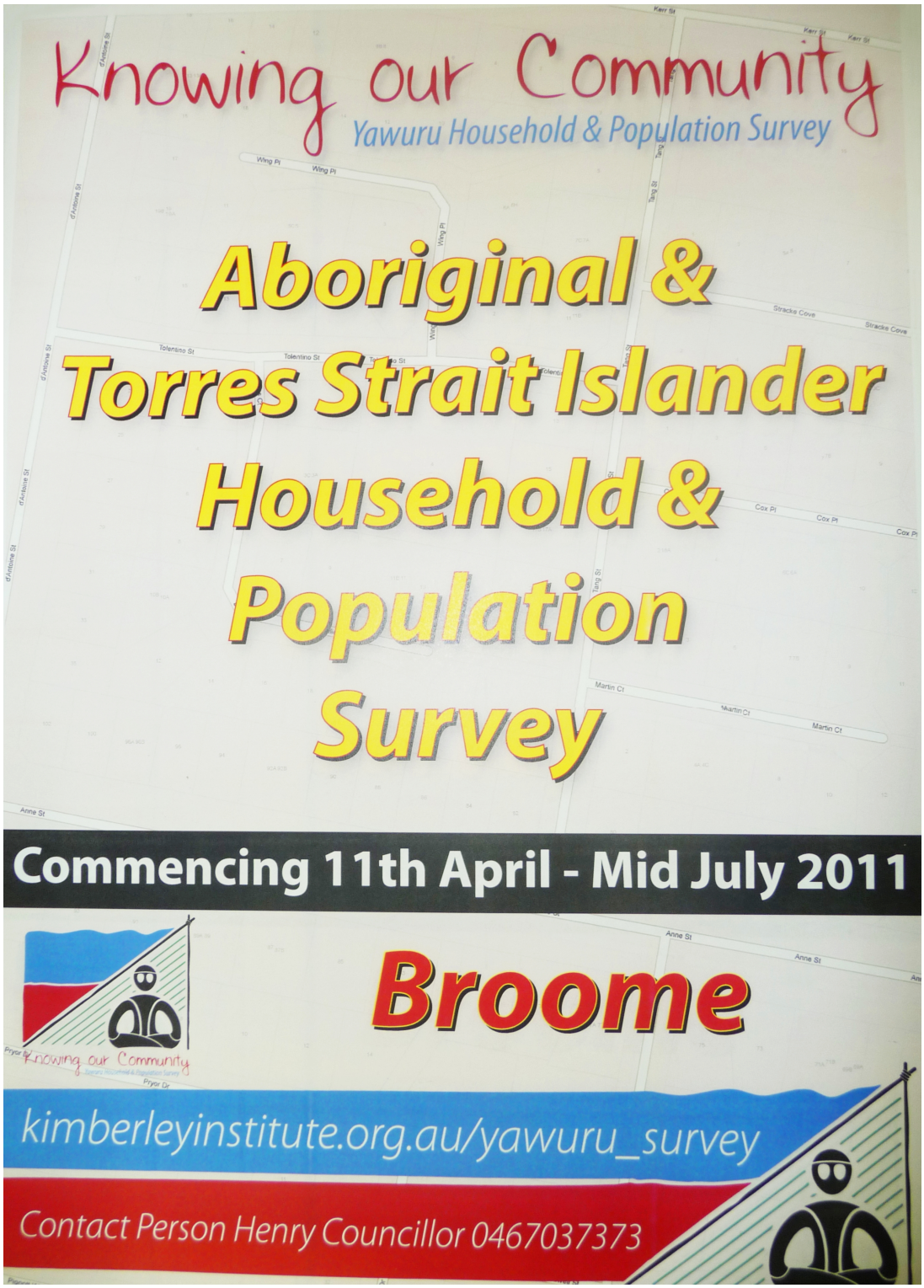

Figure 3. **Survey Publicity Poster**

The household survey commenced in mid-April 2011 and was completed by July. Throughout this period, team members working in groups of four were active each day interviewing heads of households, locating people at workplaces, organising for revisits if dwellings were unoccupied, and registering completed forms (Figure 4). These activities were conducted in such a way that the process became an exercise in community development for the survey team members involving regular debriefings and information sharing discussions about enumeration strategies and community feedback. Data was entered into an Excel spreadsheet on a dedicated PC platform in order that team members could experience the process of data collection and storage from beginning to end (Figure 5). Initial results from the survey also became the subject of community focus group discussions organised by NBY on issues related primarily to the development of a Yawuru housing policy.

Figure 4. **Survey Team Members Interviewing**

Figure 5. **Survey Team Members Entering Data**

Survey Background

The Limitations of Official Data

In 2006, the ABS Census counted a total of 2,305 Indigenous people in Broome on census night. Of those counted in the census, 2,062 were usual residents of the town and 243 were visitors from elsewhere. The census also counted a total of 2,337 Indigenous people as usual residents of Broome. This included the 2,062 counted in Broome plus a further 275 individuals who were away elsewhere in Australia on census night. It also recorded a total of 686 households (dwellings) with Indigenous occupants.

While the ABS attempts to enumerate all residents of Australia at census time, it does acknowledge that this is never fully achieved. Accordingly, a national follow-up survey of around 1 percent of all households (the Post-Enumeration Survey, or PES) is conducted one month after each census in an attempt to estimate the numbers missed. Also, for the Indigenous population, some people do not register their Indigenous status on the census form. For usual residents of Broome, this number is often substantial: in 2006 it amounted to 1,815—which was almost as much as the usual residence census count of 2,337 Indigenous people. In deriving its post-censal Indigenous (and non-Indigenous) estimates, the ABS reallocates these non-responses to each population category pro rata. Together with the estimate of net undercount from the PES, final Indigenous and non-Indigenous population estimates are then produced for Local Government Areas (total numbers only) and for larger Indigenous Regions (total numbers disaggregated by 5-year age groups and sex). These become the official population figures for local areas and they are used for important public policy purposes such as electoral redistributions, local government fiscal allocations of goods and services tax (GST) revenue, and gross estimation of local service needs.

In 2010, these various figures provided the official population data available to NBY as it commenced deliberations around its social and economic planning needs. One immediate difficulty that they presented was that the 2006 figure of 2,337 for Broome's usual resident Indigenous population was notably lower than the 2001 count of 2,514. Taken at face value, this suggested that the Indigenous population of Broome was in decline with a 7 percent drop in resident numbers over the five-year intercensal period. Needless to say, such an outcome was very much at odds with the perception of NBY and others in the Broome community who had expected to observe a growth—and not a decline—in Indigenous numbers. It was also at odds with the fact that the Indigenous net migration rate over this period was only 5 percent. The count of Indigenous persons present in Broome on census night had also decreased, but this time by 15 percent from 2,717 to 2,305. Furthermore, the 2006 Census count was suggesting a substantial reduction in the resident population in the 0 to14 year age group of almost 230, or 24 percent (Figure 6). While the numbers in town do fluctuate even on a daily basis, substantial decline of this magnitude and composition was difficult to explain. For one thing, over the 20-year period since the late 1980s, the built-up area of Broome had more than doubled, with entire new suburbs created, as illustrated in Figure 7. Higher numbers were also suggested by other indicators of population drawn from school enrolments and health service usage.

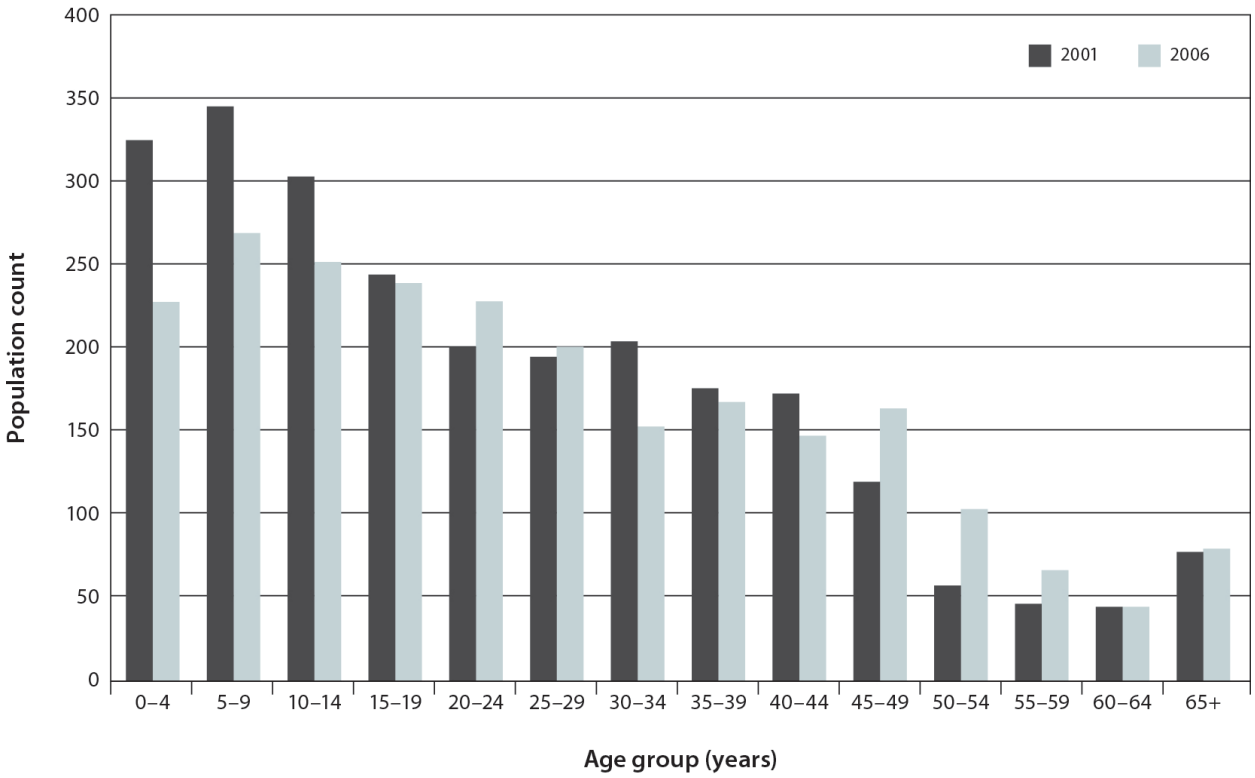

Figure 6. ABS Census Counts of Indigenous Population in Broome by Age and Sex, 2012 and 2006

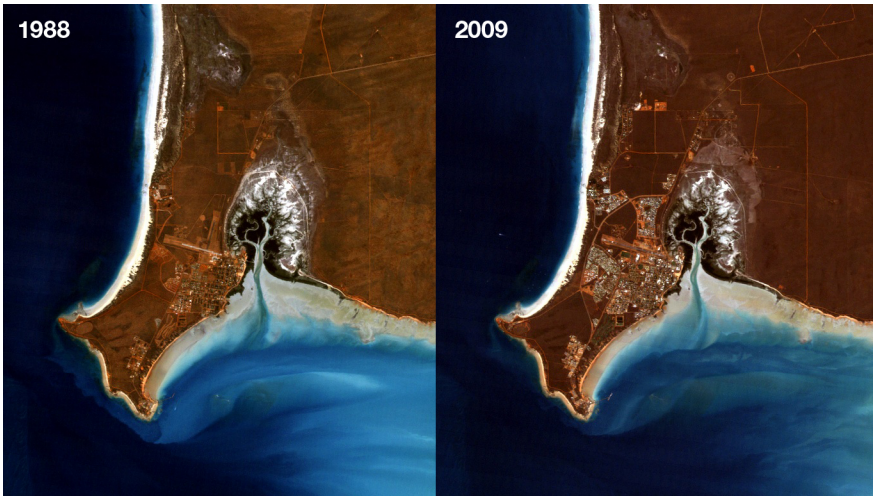

Figure 7. Satellite Images of the Broome Urban Area, 1988 and 2009

While issues of data credibility formed a significant part of NBY's decision to construct its own population database, more important was the simple fact that there have never been statistical data available for the social entity "Yawuru". To this extent, the YKC survey was both conceived of and designed to satisfy the very specific needs of a Native title group for information that suited their specific purposes. In the first instance, this would refer to all Yawuru residents of Broome, whether present or not, but because of cultural obligations and responsibilities to other Indigenous peoples resident in or visiting Broome, to say nothing of the substantial affinal ties that exist between Yawuru and other Indigenous peoples, this inevitably implied a wholesale comprehensive survey of the entire Indigenous population of Broome. The purpose was not to develop measures for comparison with the rest of the Broome population, or with any other population group for that matter. The sole aim was to ensure that Yawuru would have access to the most appropriate and complete information suited to the better understanding and fulfilment of their own aspirations and obligations as major players in the Broome economy and society. In effect it would help them to "know" their own community and to engage in strategic decision-making in a post-native title determination environment.

Although NBY was therefore focused on customising the collection of data, it was acknowledged that standard ABS definitions and interviewing procedures should apply as far as possible in order to establish some basis for comparison and subsequent benchmarking with information from the national census. Thus, usual residence in Broome was defined as spending an aggregate of more than six months of the year in town. While this could apply to usual residents who were absent, the rules for inclusion of such individuals were different in the YKC survey compared to the ABS census. The YKC survey established the residency status of absent persons indirectly via household respondents, whereas the ABS census determined this directly from absentees at their place of enumeration. A further variation was the adoption of a more inclusive view of usual residence. For example, the ABS census counts children who are away from the parental home for schooling as residents of their place of enumeration. Where respondents considered this to be inappropriate, allowance was made in the YKC survey to count such children as residents of Broome, which—physically—they frequently are, even during the school year. The same principle applied to absent workers, many of whom were engaged in fly-in and fly-out or drive-in and drive-out operations while using Broome as the home base. For benchmarking purposes, it was fortuitous that the YKC occurred in the same year as the official 2011 national census, although to ensure that these processes did not overlap, care was taken to ensure that the survey field operations were completed well before the census date in August.

Select Survey Results

A primary purpose of the YKC was the establishment of a fully comprehensive population list that would provide (for the first time) a definitive demographic profile of the Broome Indigenous population and flexibility in the reporting of that profile according to the particular population subgroups that NBY wished to represent. Thus, for example, there is no simple answer to the question: "What is the Indigenous population of Broome?" This is because several population categories can be identified, each of which has particular significance. In the ABS census, two categories are provided for: a "usual resident population"(de jure) consisting of people who usually reside in Broome for more than six months of the year (these may be present in that place at census time or enumerated elsewhere); and a "place of enumeration population" (de facto) consisting of all persons counted in Broome on census night regardless of their usual place of residence.

In the YKC survey, provision was made to identify both of these populations as well as a third category, referred to as "visitors". This category recognises that many Indigenous people, especially from other parts of the Kimberley region, are often away from their usual residence and are staying in Broome at any one time, but only on a short-term basis. While Indigenous social practice provides ready accommodation for such visitors, who are often kin-related, outside of such arrangements transient people generate a pressing need for alternate forms of temporary accommodation. Thus, different categories of visitor were identified—those in private dwellings and those in non-private dwellings or camping out. The resulting population and dwelling categories and their associated numbers derived from the YKC survey are shown in Table 1.

Population Size

The first thing to note is that the Indigenous de facto population recorded as present in Broome by the YKC survey (3,712) was 61 percent higher than the ABS census count of persons present in 2006 (2,305). Admittedly, the YKC figure was gathered five years later, but the size of the difference between these figures is too large to be explained by intervening demographic processes alone. While it is true that the YKC survey ran over eight weeks, such an extended period is also common for the ABS enumeration in remote locations such as Broome (Morphy, 2007). In any event, great care was taken in data processing to eliminate duplicate counting that this time-delay may have produced—a practice that is also held in common with ABS data processing. Therefore, the most likely explanation for the difference in counts is that the YKC survey was far more successful than the 2006 Census in identifying, engaging, and eliciting a response from the Indigenous population of Broome. As such, it is likely to be a measure of the relative effectiveness of different enumeration methodologies. This is also reflected in the fact that the YKC survey identified a total of 997 dwellings with Indigenous occupants compared to the 2006 ABS Census, which identified just 686. Even with the growth of Broome in the intervening period, it seems unlikely that Indigenous households would have increased by as much as 44 percent.

The second point to note is that the YKC count of Indigenous usual residents (3,469) was also much higher (by 48%) than the 2006 Census figure of 2,337. However, some qualification is required here: The ABS adjusts its census count of usual residents to produce a final post-censal estimate, which, as we have seen, involves an assessment of census undercount. Although no such estimate is produced for the town of Broome, the synthetic estimate of 3,123 that was calculated for the Kimberley Land Council (2010) Aboriginal Social Impact Assessment Report is lower than the equivalent YKC survey figure in 2011 of 3,469—a difference that could well reflect natural increase over the intervening period. Thus, in a rare direct test of the veracity of ABS post-census population estimates, the YKC survey figure would seem to lend support to the general level of the 2006 estimate for Broome that was derived from the ABS calculation for the Shire, although the YKC survey figure is still 11 percent higher.

Table 1. YKC Survey Population Numbers by Population Category and Dwelling Categories, 2011

Indigenous Private Dwellings	Number of Persons
Indigenous residents present	2,904
Indigenous residents absent	240
Indigenous visitors	317
Non-Indigenous residents present	214
Non-Indigenous residents absent	10
Non-Indigenous visitors	7
Indigenous de jure residents declined to participate[a]	235
Indigenous de facto residents declined to participate[a]	242
Non-Indigenous de jure residents declined to participate[a]	17
Non-Indigenous de facto residents declined to participate[a]	17
Indigenous de jure population in private dwellings	3,379
Indigenous de facto population in private dwellings	3,463
Total de jure population in Indigenous private dwellings	3,620
Total de facto population in Indigenous private dwellings	3,684

Indigenous Non-Private Dwellings/Camping Out	Number of persons
Residents	90
Visitors	159
TOTAL Indigenous persons in non-private dwellings	249
TOTAL Indigenous de jure population	3,469
TOTAL Indigenous de facto population	3,712
TOTAL Indigenous service population	3,945
TOTAL potential Indigenous service population[b]	8,763

Notes. Source: YKC Survey (2011).

[a] Estimated by the application of average occupancy rates from participating households.

[b] Estimated as Indigenous service population minus current Indigenous visitors to private dwellings plus estimate of maximum Indigenous visitors to private dwellings from survey questions.

A third point to note, from a NBY perspective, is that the real population number for planning purposes is what is termed here "the Indigenous service population". This is basically the sum of all Indigenous people associated with Indigenous households in Broome plus Indigenous people located in non-private dwellings in Broome or camping out at any one time. This number is larger again at 3,952. In fact, recognising that visitor numbers fluctuate over the year and that there are times of peak flow involving larger numbers, the YKC survey went further still and asked each household to estimate the largest number of visitors ever to have stayed at each dwelling at a single time during the past year. This question was used instead of attempting to establish the cumulative flow-through of visitors during the year as the latter figure was considered too difficult for householders to estimate in any reliable way due to problems of recall. A sum of the responses to the substitute question produced a figure of 5,128. If this is added to the existing service population (minus current visitors) then a figure of 8,763 can be derived as a proxy indication of the overall peak potential annual visitor plus resident load on Broome housing, services, and infrastructure. This, of course, is an artificial construct as not all visitors would be present at the same time (although something approaching this can occur on occasion). It is provided simply to establish some quantitative basis for a discussion of the likely overall upper scale of annualised pressure on housing.

Finally, survey respondents were asked to nominate their primary language group affiliation and that of other household members, as well as any other language group affiliations that individuals may have with an option for up to four categories. At least one language group affiliation was recorded for fully 97 percent of the survey population. Yawuru was the largest of these, accounting for more than a quarter (28%) of the usual resident population (excluding those who did not participate in the survey).
Not surprisingly, given the emergence of Broome as a major regional service centre, this survey question uncovered the complexity of Indigenous residency, with more than 50 other language groups reported, some more common than others. Bard, for example, was very prominent, as were other affiliations to the nearby Dampier Peninsula and wider West Kimberley region. Beyond this, language affiliations to the Central and East Kimberley featured, as did connections south to the Pilbara region and Noongar country in and around the Perth metropolitan area. Other reported language groups were from all across Australia, especially from the Northern Territory and Torres Strait. The point to note is that while Yawuru are the single most prominent group, many other Indigenous groups reside on and visit Yawuru country, to say nothing of the majority non-Indigenous population.

Age Distribution

Aside from overall numbers, it is the distribution and structure of the population by age and sex that has major implications for social and economic planning, both in terms of assessing current needs of select target groups and in determining the future composition of needs as different cohorts age. Figure 8 shows the distribution of the Indigenous usual resident population of Broome by age and sex, including those in private dwellings, those absent from private dwellings, and those in non-private dwellings or homeless. Several features in this age distribution are worthy of note. First, the broad base of those aged 0 to 4 years relative to those aged 5 to 14 years is suggestive of current high fertility, resurgent after recent decline - although it may also reflect some age misreporting. Second, the rapid taper with advancing age highlights continued high adult mortality, especially among males. Third, relatively large numbers of women in the child-bearing ages and even larger cohorts beneath them indicate high potential for future growth in numbers, even if the actual fertility rate were to decline. Finally, there is a

preponderance of women over men in over-35 age groups, which is likely to reflect a combination of male out-migration for employment and the higher adult survival rates for females that are commonly observed across remote Australia.

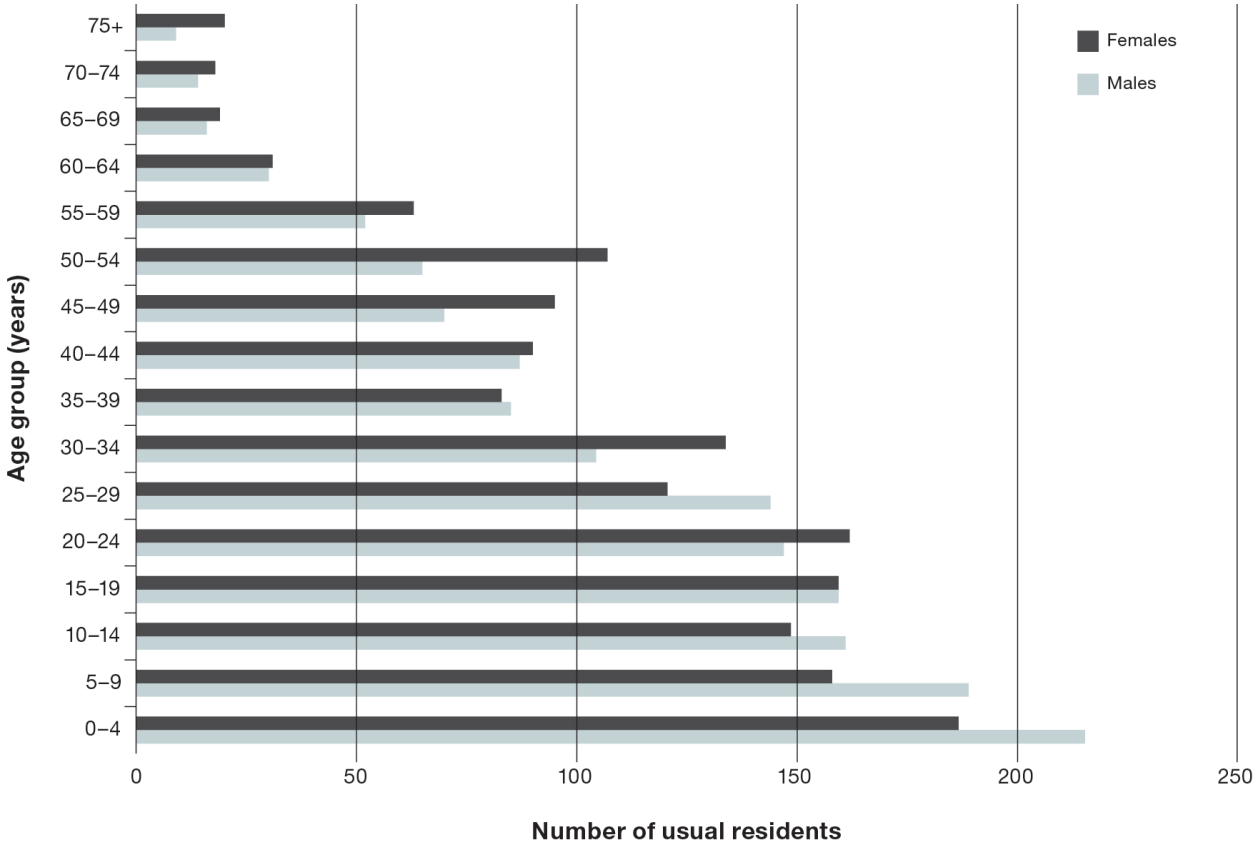

Figure 8. **Distribution of Indigenous Usual Residents by Age and Sex**

For community planning purposes, the significance of these age data is best revealed by grouping them into age ranges that form the focus of policy interest. From the perspective of addressing current educational needs, the Council of Australian Governments' focus on securing universal preschool access and proposals for extending compulsory schooling through to age 17 under "learn or earn" programs, suggests a number of relevant groups. First of all are those of infant age (0 - 3) followed by those in preschool and transition years (4 - 5). Presently, the compulsory school age in Western Australia is 6 to 16 years inclusive, although there are proposals to raise this to 17 years. Then there are the transition years from schooling into higher education or the workforce (18 - 24), followed by the years of prime working age and family formation (25 - 54) and finally an aged group, which is set here at 55 years and over to recognise higher Indigenous adult mortality and morbidity. The size of each of these age groups is shown in Table 2.

Table 2. Size of Policy-Relevant Age Groups in Broome: Indigenous Usual Residents, 2011

Policy/Age Group (years)	Number[a]	Percentage of Usual Resident Population
Infant (0 - 3)	280	8.7
Pre-school (4 - 5)	162	5.0
Compulsory school age (6 - 16)	728	22.7
Broad school age (4 - 17)	959	29.9
Young adult (18 - 24)	421	13.1
Young adult (25 - 34)	522	16.2
Middle adult (35 - 54)	709	22.1
Old adult (>55)	319	10.0

Note. Source: YKC Survey (2011).
[a] Table columns sum to greater than the table population due to overlap between the compulsory and broad school age groups.

In any discussion or assessment of community planning needs, these sorts of cohorts, whether comprised of residents or visitors or various combinations of these, provide the base quantum net of any sub-cohort characteristics (such as special needs students) that might imply particular requirements. A basic argument is that there is a need to consider the implications of cohort progression. The most pressing example of this is to contemplate overall community outcomes in Broome in 20 years' time, when those currently aged 35 to 54 years become a smaller group aged 55 years and over, while, in turn, they are replaced by the larger block currently aged 18 to 34 that will become the future working and parental group aged 35 to 54. What educational and training needs for succession do these shifts imply? The same question may be asked of the large block of current school-age children (almost 1,000 in total).

Movement In and Out of Broome

One of the difficulties encountered in accurately enumerating and portraying the Indigenous population of Broome is the high level of mobility and consequent population turnover that occurs on a daily, weekly, fortnightly, monthly, seasonal, and irregular basis in and out of town (Prout & Yap, 2010). This is similar to the "churn migration" observed elsewhere among Indigenous populations, notably in Canada (Norris & Clatworthy, 2003; Norris, Clatworthy, & Peters, 2013) but also in the United States (Snipp, 2004). Those who count themselves as residents of Broome are often away elsewhere for a variety of periods of time and for a variety of reasons to do with work, education, training, holidays, social visits, funerals, shopping, and accessing services. Others, who are usually resident elsewhere, often visit Broome also for varying periods of time and for much the same mix of reasons.

The YKC survey provides a window into these movements and enables profiling of constituent elements. For example, the age distribution of usual residents who were absent from Broome at the time of the survey is shown in Figure 9. This shows that at the time of the survey there was a clear concentration of absentees in school-age years, especially at secondary level, as well as among young adults, while relatively few old people were away from Broome. The other feature to note is that most absent residents were male. This age and sex distribution is largely a product of the major reasons for absence that were provided by household respondents on behalf of absent residents. These were (in declining rank order) education, training, and employment; social visits; and medical reasons. As noted, the identification of absent residents in the YKC survey varied from standard ABS practice by counting children who were away from the parental home for schooling reasons as resident. While ABS practice is to count these as residents of the host locality, respondents to the YKC survey viewed them as very much part of the Broome community and, indeed, they were often reported as present in Broome during the school year. This also applied to many absent mine workers who were engaged in fly-in and fly-out or drive-in and drive-out operations while using Broome as the home base.

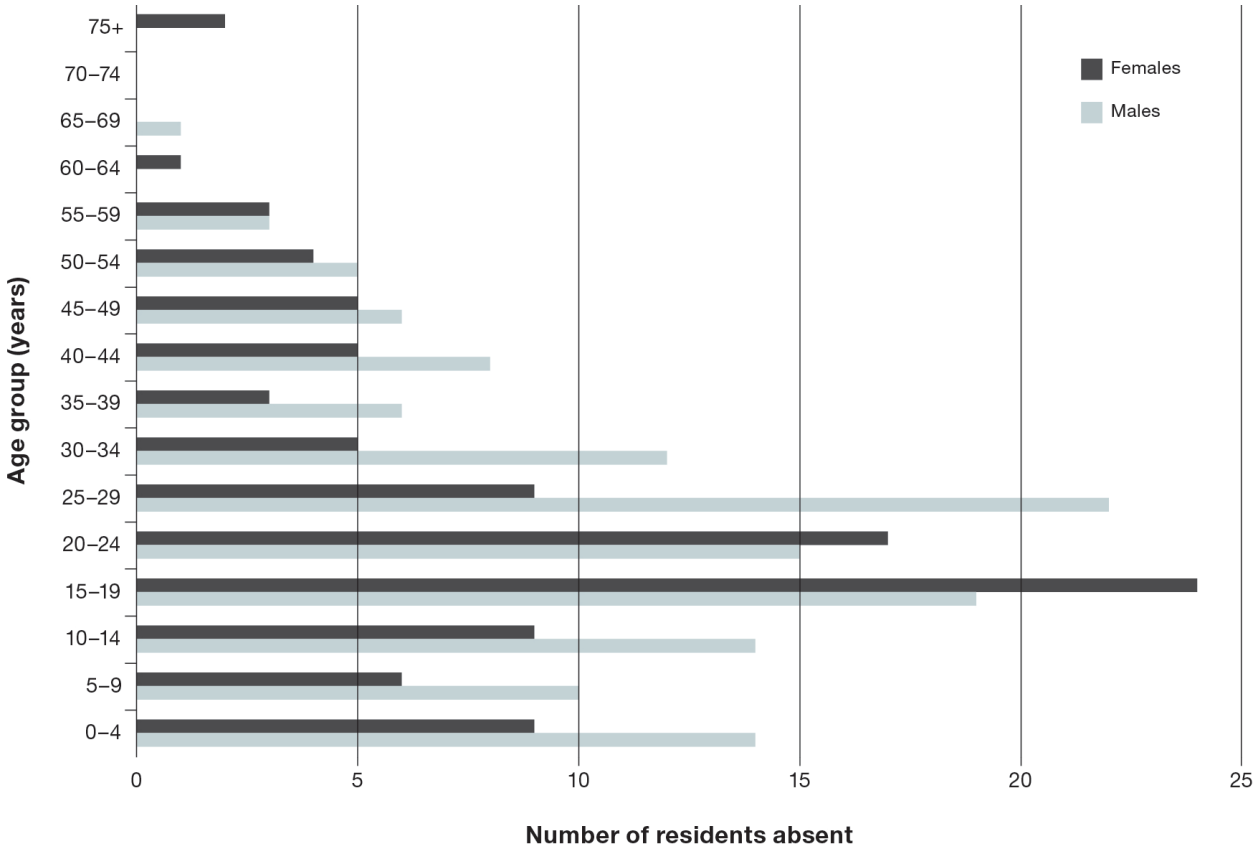

Figure 9. Distribution of Indigenous Absentees by Age and Sex

The origins of Indigenous visitors to Broome varies according to whether they are accommodated in private dwellings, and therefore basically staying with relatives, or whether they are accommodated in an institutional setting, such as a hostel, or camping out with no basic shelter provision. Those staying in private dwellings originate mostly from communities in the immediate surrounding region, although substantial numbers also originate from other urban centres in Western Australia as well as from other states and territories. Interestingly, this pattern is partly reflective of the Yawuru diaspora. In contrast, visitors to Broome who are accommodated in non-private dwellings or who are camping out reveal a distinct inflow from all parts of the Kimberley, reflective of the fact that individuals and families from across the region frequently access the town as a key Kimberley service centre.

The combined demographic effect of these movements of residents and visitors into and out of Broome over an annual cycle is difficult to establish in terms of the annual load that it places on service providers and infrastructure. Suffice to say, a basic cross-sectional count of the Broome Indigenous population at any one time is insufficient in representing this population. As noted in Table 1, the YKC survey attempted to establish such an estimate by gathering information on the maximum number of visitors to each dwelling during the year prior to the survey. In effect, this technique suggests that the "potential" Indigenous population that is serviced by Broome over an annual cycle (in so far as individuals who spend time there either directly or indirectly make use of town facilities) is likely to be more than twice the size of the resident population at any one time. As a consequence, any base estimates of need that are derived from cross-sectional data are almost by definition conservative.

Spatially-Enabled Community Development Planning

In recent years, there has been a growing adoption of GIS technologies for use as a decision support system in socioeconomic analysis and planning across public and private sector agencies (Haynes, Lovett, & Sünnenberg 2003; Hugo 2001). In Australia, these trends have given rise to an increasing number of "spatially-enabled" government departments and agencies that have the capacity to generate high-quality spatial data and establish clear procedures for custodianship, data sharing, and analysis. The Geocoded National Address File (G-NAF) is a good example of these developments. The concept of an authoritative national address file evolved from 1995 onwards and developed with contributions from numerous commonwealth, state, and territory agencies, as well as statutory bodies such as the Australian Electoral Commission and Australia Post. It now houses over 13 million accurately geocoded addresses and is regarded as the definitive national address dataset (Public Sector Mapping Agency, 2012). The G-NAF has a wide range of applications in community planning and has been used to generate additional spatial data products such as the ABS Meshblocks - a new microscale component of ABS census geography that is now being used in the processing of census data and all other ABS spatial data outputs as the basis of the new Australian Standard Geographical Classification (ABS, 2011).

While these developments have gathered pace, to date there has been little attempt to consider their application to Indigenous community planning. One of the key features, therefore, of the YKC survey and its resultant database is an ability to link this database with the G-NAF within a GIS in order to generate new spatial perspectives on community planning issues. This linking of the YKC database with the G-NAF is a significant innovation as it opens up numerous avenues for targeted spatial analysis at the local level and it provides NBY with the means to develop a sophisticated decision support system. In short, NBY is in the process of becoming as spatially enabled as many larger agencies and it is now in a

position to bring issues to the table that have hitherto been beyond reach. Before presenting some examples of this GIS application it is instructive to consider how the matching of survey data to the G-NAF presented some issues of its own, as it is likely that these are more widespread in locations where Indigenous populations have a significant presence.

In building the NBY GIS a number of steps were undertaken to geocode the YKC survey data (Table 3). The first of these involved an address locator to match Indigenous dwellings in the survey to the G-NAF. This resulted in 635 (68.5%) dwellings being successfully geocoded. As indicated in Table 3, the second step involved removing housing unit separators from the survey data address field to better align individual households with the G-NAF format. This step enabled geocoding of a further 138 dwellings, thereby raising the level of geocoded households to 83.5 percent. At this point, manual techniques were required to geocode the remaining households on a case-by-case basis. This accounted for a further 89 dwellings, which meant that a total of 59 dwellings (6.5% of the total) could not be found in the G-NAF. It is significant to note that the vast majority of these were located in Aboriginal Land Trust (ALT) areas and in well-known camping sites around the urban area, as this raises the prospect that a similar omission from the G-NAF may apply across the country in locations where Indigenous land tenure and living areas prevail. The location of these sites in Broome was determined by generating a GIS layer using ALT tenure maps and then by applying a combination of Google Earth imagery and collective community knowledge to identify individual dwellings and other domiciles. This final procedure raised the final level of geocoding of dwellings to 99.2 percent, which represents a very high "hit rate" for address matching by any standards.

Table 3. Where Do People Live in Broome? Matching the YKC to G-NAF

	Number of dwellings geocoded	Percentage of dwellings geocoded
Geocoded using address locator and G-NAF as reference data	635	68.4
Unit separators removed (e.g. Unit 5/5 Smith Court), address locator re-run	138	83.3
Manual Geocoding of remaining records-manual matching of G-NAF using Google Earth and local knowledge	921	99.8

Note. Dwellings coded for initial analysis were drawn from the 923 households that participated in the survey. Source: YKC Survey 2011.

NBY GIS Applications

The goecoding of survey dwelling and household information as a foundational layer in a dedicated NBY GIS establishes for the first time a platform for raising and interrogating spatial relationships within Broome between demographic and other variables as a means to support social policy decision-making. The first opportunity that the NBY GIS provides for is the construction of a more socially informed map of Broome neighbourhoods. This was developed by the YKC survey team using cognitive mapping and a simple digitisation of the overlay boundaries drawn onto a street map of Broome as agreed collectively by the team. In the process of developing the survey strategy, the survey team collectively identified neighbourhoods that had local relevance in terms of known concentrations of Indigenous households as opposed to areas where these were more dispersed amongst other households. This formed the spatial framework for the survey field operations. In ABS collections, the equivalent category to date has been the Collection District, which is a purely administrative construct based on the determination of a reasonable enumerator dwelling load which is then allocated to individual census collectors. While the YKC approach was somewhat similar, the starting points for allocation were these various social spaces within Broome that were established from a more colloquial perspective. Altogether, 16 such "neighbourhoods" were identified and these have been entered into the NBY GIS as one of the many spatial layers upon which the survey results can now be reported.

Population Concentrations

Another such layer is provided by the distribution of individual dwellings across Broome and its rural hinterland, as shown in Figure 10. The accurate geocoding of survey data provides the core component within the NBY GIS and it lays a foundation for all subsequent system inquiries linked to housing and population. As can be seen, most Indigenous dwellings are located within the Broome urban area, but there are also notable rural outliers. As we know the Indigenous population resident in each of these dwellings, we can use GIS algorithms to generate a population density surface as shown in Figure 11. This reveals a striking spatial pattern with two major concentrations of Indigenous population in the older suburbs of Broome in the south of the urban area. While there are Indigenous households elsewhere in the urban area, their representation is far less intense. In fact, given the plans for future urban development in Broome (essentially northwards away from the old town), the broad emerging pattern seems to be one of a Broome South that is predominantly Indigenous and a Broome North that is mostly non-Indigenous, leaving aside pockets of Indigenous settlement on Aboriginal-owned lands in the urban area. This configuration has significant implications for the location of current facilities and services in terms of their physical accessibility to Indigenous residents. It is significant, then, that the creation of the NBY GIS means that any consideration of where to best locate services within Broome can now be informed by a precise measure of this accessibility and that this can be adjusted to address the needs component parts of the population, such as different age groups.

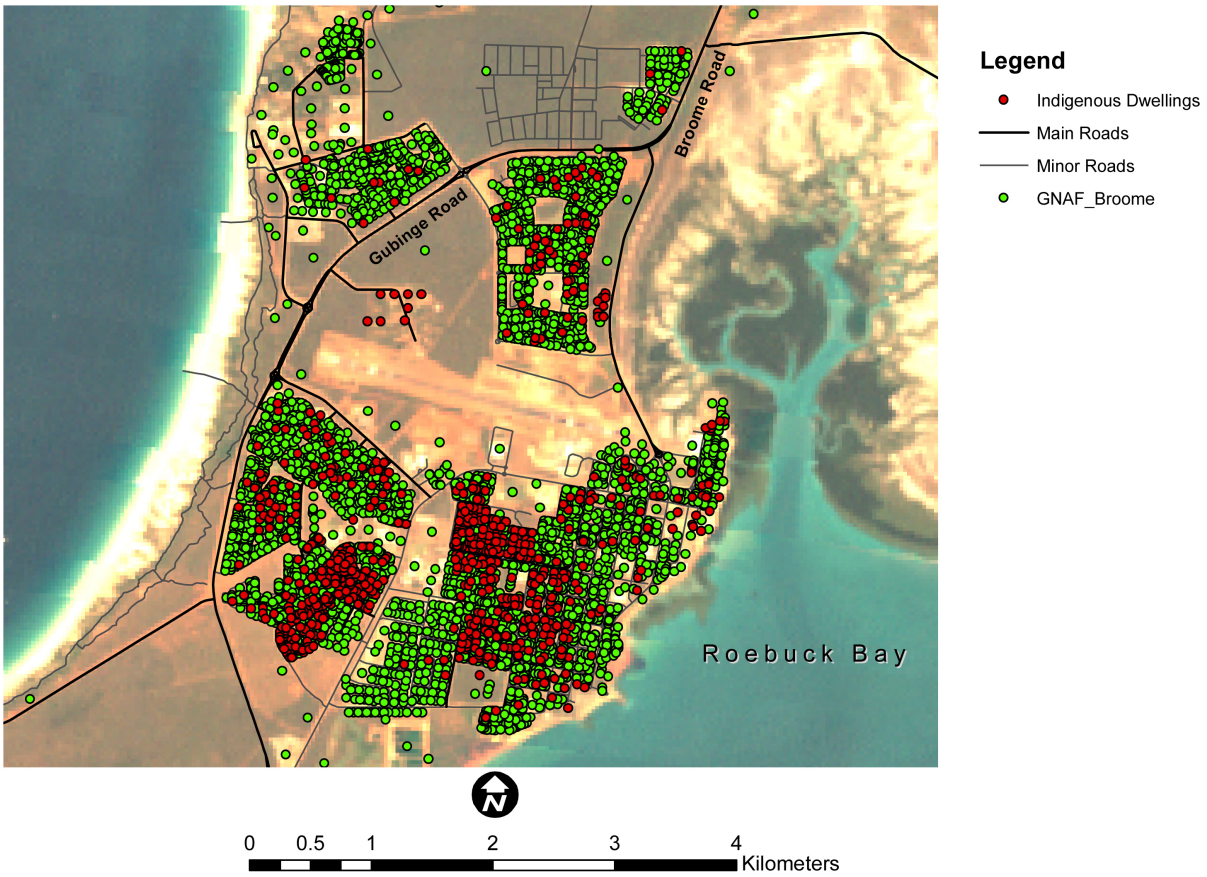

Figure 10. Distribution of Indigenous Dwellings

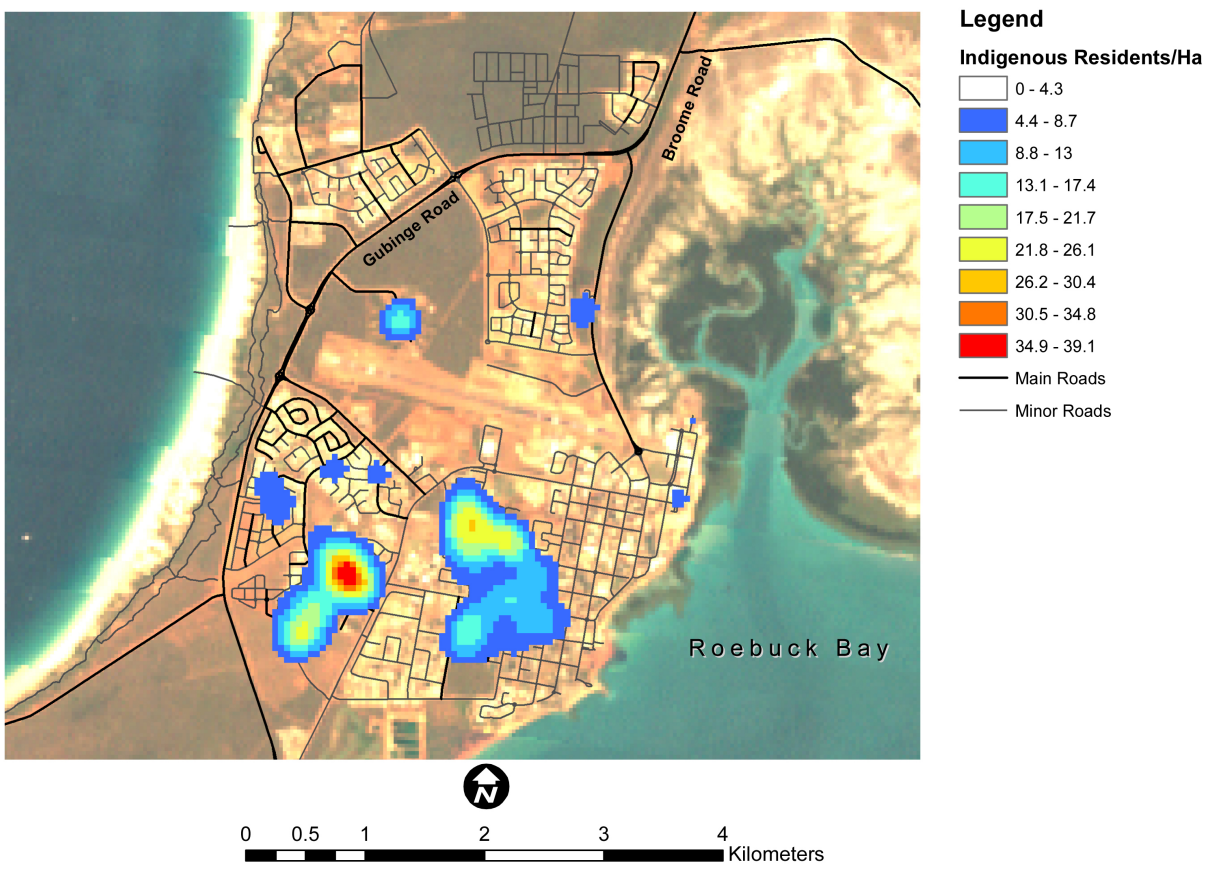

Figure 11. Indigenous Population Density Surface

Housing Tenure

A further GIS layer is provided by data on housing tenure. This demonstrates that the concentration of Indigenous population on the south side of Broome is strongly associated with the distribution of public rental (Homeswest) accommodation, as indicated in Figure 12. The survey revealed that more than half of all Indigenous households in Broome occupy public rental dwellings and that the vast majority of these are located in the areas of population concentration in the old part of town. Many of these households reported and provided details of significant backlogs in house maintenance and, as a consequence, NBY has been able to make representation to the Western Australian Government on their behalf.

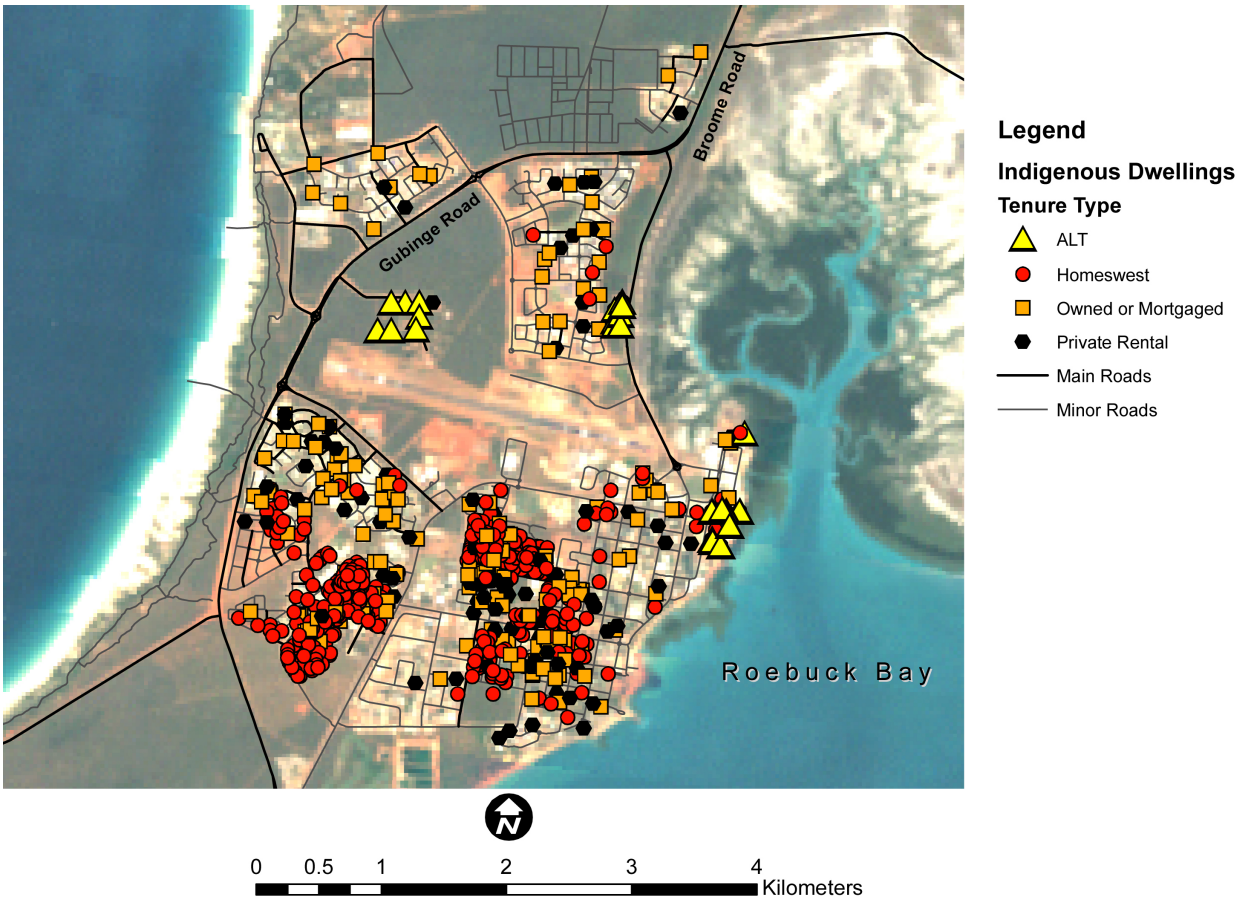

Figure 12. **Distribution of Indigenous Dwellings by Housing Tenure**

Of particular interest for NBY is the survey finding that almost a third of Indigenous householders are in privately-owned or private rental dwellings, and that the distribution of those in home ownership is quite widespread. Housing on Aboriginal Land Trust land provides a further tenure cluster. While there is some concentration of private tenure in Old Broome as a consequence of earlier phases of government rent/buy schemes, some Indigenous households have clearly found the capacity to buy in to all parts of Broome, including in the newer developing suburbs in north Broome. A similar pattern emerges in regard to private rental tenure. Information generated by the survey on households who face financial hardship as a consequence of this private tenure has enabled NBY to conduct targeted follow-up discussions regarding potential assistance.

Access to Public Transport

Considerations of accessibility are often at the forefront of housing and planning challenges in areas that are characterised by rapid development and its associated population growth. Given the demographic and infrastructure changes currently taking place in Broome and the pressure this creates for substantial expansion of the urban area and further dispersal of amenities, an increasingly urgent issue is emerging

with regard to the access that Indigenous residents have to cheap public transport as opposed to the more expensive option of hiring taxis (which is common), or the more taxing option of walking everywhere to satisfy basic needs such as shopping, visits to the doctor, attending school, etc. (which is also common). The 2006 Census reported that 21 percent of Indigenous households in Broome had no vehicle, compared to just 3 percent of non-Indigenous households. In order to determine the implications of this lack of available personal transportation, the NBY GIS can be used to determine the exact level of physical proximity of Indigenous households to the Broome Town Bus service and suggest ways in which this might be maximised.

By introducing the location of each bus stop in Broome as a GIS layer, the straight-line distance to the nearest bus stop for each Indigenous household is easily calculated. This initial component is regarded as a fundamental part of accessing the broader public transport network (Liu & Zhu, 2004). The distance between homes and the nearest bus stop can also be categorized according to the walking distance buffers established for a large urban area in Australia by Yigitcanlar, Sipe, Evan, & Pitot (2006):

- High access (a walking distance of less than 300 metres to the nearest bus stop);
- Medium access (a walking distance of between 300 and 400 metres to the nearest bus stop);
- Low access (a walking distance of between 400 and 800 metres to the nearest bus stop); and
- Poor access (a walking distance of greater than 800 metres to the nearest bus stop).

The GIS can then generate boundaries for these categories in relation to Indigenous dwellings in Broome and the number and proportion of dwellings and people within each can be calculated. Given the relatively small spatial extent of Broome compared to the urban comparator used by Yigitcanlar et al. (2006), this is done for the two narrower distance buffers in Table 4. It can be seen that only 14 percent of Indigenous dwellings accounting for 11 percent of Indigenous people have high levels of access to bus stops while medium access is available for only a further 7 percent of dwellings and 8 percent of the population. This means that 79 percent of dwellings incorporating around 80 percent of the population have low or poor access to public transport. As a consequence, the vast majority of Indigenous people in Broome are likely to be disinclined to access this service, all other things being equal, and this may account for their distinct lack of utilisation of what, in normal urban environments, is a standard means of transportation and mobility for low income groups. To provide further context, Figure 13 also shows these higher access buffers in relation to the underlying population density of Indigenous residents and this reveals emphatically that the two primary concentrations of Indigenous residents in Broome are mostly located outside the boundaries of the high to medium access.

Table 4. Indigenous Dwellings and Residents with High and Medium Access to Public Transport, Broome, 2011

Level of Access to Public Bus Stops	Number of Dwellings	Percentage of Dwellings	Number of Residents	Percentage of Residents
0 - 300m (high)	127	13.7	399	11.5
300 - 400m (medium)	72	7.7	274	7.9
Total within 400m	199	21.4	673	19.4

Note. Source: NBY GIS.

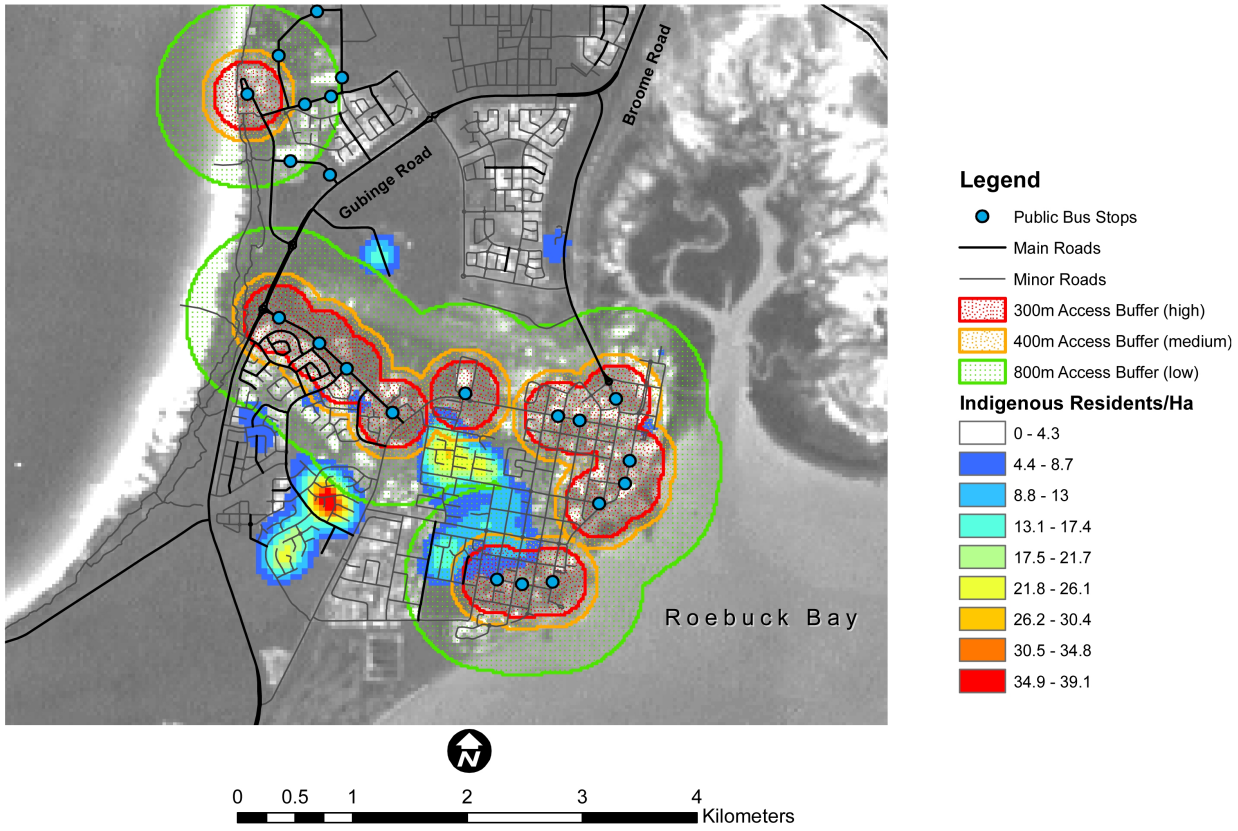

Figure 13. **Public Transport Access Buffers in Relation to Indigenous Population Density**

This spatial mismatch between the distribution of Indigenous dwellings and a key urban service raises a number of wider questions about equitable access to facilities and it provides a highly practical case for considering whether more optimal spatial outcomes could be designed to provide for more acceptable levels of access for Indigenous residents. With its GIS capacity, NBY is now in a position to explore such

optimal configurations. Obviously, these would be drawn into the areas of highest Indigenous population density and Figure 14 and Table 5 show the impact of the simple addition of a new route segment involving just two new bus stops and how this would impact on the issue of access to public transport. A simple alteration to the bus route substantially raises the level of accessibility with high access rising from 13.7 percent of dwellings and 11.5 percent of the population to 41.3 percent and 43.0 percent, respectively. With this configuration, more than half of Indigenous dwellings and people would be within 400m of a bus stop. Depending on the level of precision required, this sort of calculation could be enhanced by incorporating temporal aspects of public transport access and what services/town amenities Indigenous residents would be likely to connect to. As noted, the distance buffers presented here are based empirically on a densely-populated city on the eastern seaboard. As such, the assumptions behind the walking distances adopted may not translate accurately to the Broome context. Once again, GIS techniques can be applied in combination with cognitive mapping to incorporate more behavioural elements of accessibility and determine locally-specific walking thresholds. This type of iteration in the process of GIS inquiry is typical of its use as a decision-support system and demonstrates the new capacity for Yawuru to actively engage in community planning.

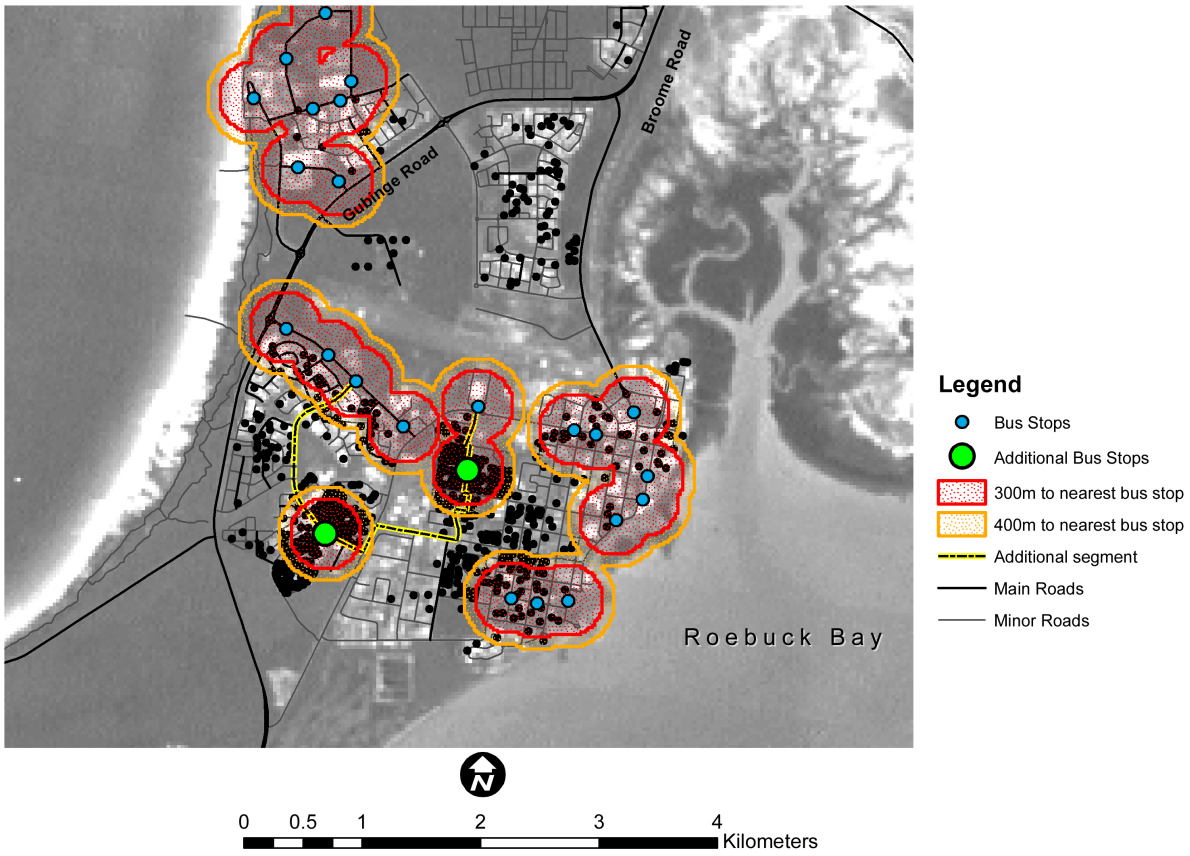

Figure 14. Recalibration of Public Transport Access Buffers Using Modified Route

Table 5. Indigenous Dwellings and Residents with High and Medium Access to Modified Public Transport Route

Level of access to bus stops	Number of dwellings	Percentage of dwellings	Number of residents	Percentage of residents
0 - 300m (high)	383	41.3	1,492	43.0
300 - 400m (medium)	132	14.2	489	14.1
Total within 400m	515	55.5	1,981	57.1

Note. Source: NBY GIS.

Conclusion

In the first instance, the YKC survey was deemed necessary by the Yawuru people because of a perception by them that official census data had, in the past, significantly undercounted the Indigenous population of Broome. More importantly, a further constraint was the incapacity of official data to represent the cultural diversity of the Indigenous population that lives on or visits Yawuru country. Yawuru decision-makers did not know the numbers of Yawuru people or of any other cultural groups in Broome, but it is increasingly clear in a post-native title determination era that some mechanism for quantifying such groupings is necessary. The YKC provides a practical example of how this can be achieved.

An important innovation to arise from the survey has been the ability to geocode all survey information within a GIS. The products and services that are generated by spatially enabled government departments are increasingly being viewed as common goods available to citizens and businesses. This has led to a shift in focus from data production and delivery to applications as products and/or services (Thomas, Hedberg, Thompson, & Rajabifard, 2009) and it has enabled the emergence of a wide range of social and community planning applications (Hugo, 2001). In this instance, the NBY experience demonstrates how a product like the G-NAF can be linked to a detailed Indigenous household survey to provide distinct local perspectives on issues of concern. So far, this has focused on population and dwelling information, but the recent cultural management plan developed by NBY for Yawuru coastal country lists a number of key threats and pressures in Broome that also have distinct spatial elements, including growth in tourism activities, increased fishing effort, and increased mineral resource exploration and development (Yawuru Registered Native Title Body Corporate, 2012). With the NBY GIS framework and approach now in place, future surveys within Yawuru country, whether social, economic, cultural, or environmental in focus, can add their outputs to an interactive spatial reference library for the Broome region in order to further enhance decision support and negotiation capacity.

Yawuru leaders are acutely aware of the importance and power of having such a tool relating to their own people and in their own hands. The data gathered by the survey are owned and managed by the Yawuru Body Corporate. They are stored on password-protected systems and managed by the NBY Social Policy Unit with access available to all Yawuru members subject to approval by the General Manager. They are used for compiling submissions for funding and for NBY's own research and planning. The practical and symbolic importance of this in regard to the YKC survey can be outlined as follows:

- It provides Yawuru with an informed basis for decision-making.
- It assists a dialogue between different native title groups in the Broome and West Kimberley regions who could be will be affected by pressure for mineral resource developments in the region with the aim of building a concerted Aboriginal approach to managing the impacts of industrial development.
- It provides a baseline to measure impacts of economic and social change on Aboriginal society.
- It provides a basis for informed dialogue with Aboriginal interests, government, and industry.
- It provides a basis of accountability for public policy and investment for Aboriginal development in the region (Yu, 2012).

This development in Broome begins to raise interesting questions about the proper role of public agencies, such as the ABS in Australia and their equivalents around the world, who gather statistics on Indigenous populations. Whereas in the past, governments in Australia have been content to generate a social category known as the "Indigenous population" as essential input to public policy, the legal and moral framework for this singular attribution has been—and is—shifting, such that individual groupings of Indigenous peoples are reasserting identity through legal means and acquiring rights with responsibilities to operate as significant institutional players at the local level.

While a demography of "Indigenous population" may be well suited to the broad provision of citizen rights, what it does not provide for is the expression of Indigenous interests in inherent and proprietary rights manifest in the many forms of native title settlement and agreement-making of various forms that increasingly exist for incorporated land-holding groups. These structures provide the means by which Indigenous peoples in Australia express collective identities and seek to negotiate for their needs and aspirations including fundamental issues of recognition, inclusion, and economic opportunity and, yet, we have no data mechanisms to inform or evaluate them. As we have shown, this void is slowly being filled by Indigenous groups themselves and significantly such aspirations are now codified as rights in the *United Nations Declaration on the Rights of Indigenous Peoples* (United Nations, 2008). It is not surprising that Indigenous peoples and signatory governments around the world have started to contemplate what exactly their endorsement of the Declaration might mean for the usual practice of government business. Discussion at the UN on this matter continues to focus around Article 42 of the Declaration and the so-called "implementation gap", where even good intentions by states in the form of legislative and administrative initiatives fail to facilitate the enjoyment of rights (Malezer, 2009). Whilst

not denying a continuing and proper role for centralised data collection, what these new institutional players are likely to seek from those agencies that have skills in data collection and management is a mechanism to enable capacity-building for the local compilation and use of data as a means of promoting full and effective participation in community governance and development planning.

In asserting this desire, the key international lessons to arise from the Yawuru experience are, first and foremost, to have in place a professional and well-functioning Indigenous community governance structure that provides for the administration of collective goals (in the Yawuru case, this is provided by NBY); second, for the executive of organisations such as NBY to recognise and accept the need for the collection of socioeconomic data regarding its constituency; third, for this body to establish an arm of its operation that is dedicated to the task of data collection, management, analysis and reporting; and finally, that appropriate training and professional development opportunities are established for relevant Indigenous personnel to enable them to carry out and expand their professional functions.

References

Australian Bureau of Statistics [ABS]. (2007). *ABS directions in Aboriginal and Torres Strait Islander statistics* (Cat. no. 4700.0). Canberra: Author.

Australian Bureau of Statistics [ABS]. (2011). *The Australian Standard Geographical Classification* (Cat. no. 1216.0). Canberra: Author.

Coombes, B., Johnson, J. T., & Howitt, R. (2013). Indigenous geographies II: The aspirational spaces in postcolonial politics - reconciliation, belonging and social provision. *Progress in Human Geography, 37* (5), 691 - 700.

Haynes, R., Lovett, A., & Sünnenberg, G. (2003). Potential accessibility, travel time, and consumer choice: Geographical variations in general medical practice registrations in eastern England. *Environment and Planning A, 35*, 1733 – 1750.

Hugo, G. (2001). Addressing social and community planning issues with spatial information. *Australian Geographer, 32* (3), 269 - 293.

Kimberley Land Council (KLC). (2010). *Aboriginal social impact assessment report, Kimberley LNG Precinct Strategic Assessment; Indigenous Impacts Report* (Volume 3). Broome: Author.

Kukutai, T., & Taylor, J. (2012). Postcolonial profiling of indigenous populations: Limitations and responses in Australia and Aeotoroa/New Zealand. *Espace, Populations, Sociétés, 2012* (1), 13 - 27.

Liu, S. X., & Zhu, X. A. (2004). Accessibility analyst: An integrated GIS tool for accessibility analysis in urban transportation planning. *Environment and Planning B: Planning & Design, 31*, 105 – 124.

Malezer, L. (2009, January). *Dialogue with States regarding respect for and application of the UN Declaration and follow up on its effectiveness.* Paper presented at the International Expert Group Meeting on the Role of the United Nations Permanent Forum on Indigenous Issues in the Implementation of Article 42 of the United Nations Declaration on the Rights of Indigenous Peoples, *New York.*

Morphy, F. (Ed.) (2007). *Agency, contingency and census process: Observations of the 2006 Indigenous enumeration strategy in remote Aboriginal Australia*. Canberra: ANU E Press.

Native Title Act. (1993). (Cth), ss 55 - 57

Norris, M. J., & Clatworthy, S. (2003). Aboriginal mobility and migration within urban Canada: Outcomes, factors and implications. In D. Newhouse & E. Peters (Eds.), *Not strangers in these parts: Urban Aboriginal peoples* (pp. 51 - 78). Ottawa: Policy Research Initiative.

Norris, M. J., Clatworthy, S., & Peters, E. J. (2013). The urbanization of Aboriginal populations in Canada: A half century in review. In E.J. Peters & C. Andersen (Eds.), *Indigenous in the city: Contemporary identities and cultural innovation* (pp. 36 - 64). Vancouver: UBC Press.

Prout, S., & Yap, M. (2010). *Indigenous temporary mobilities and service delivery in regional service centres: A West Kimberley case study* (CAEPR Working Paper No. 66). Canberra: Centre for Aboriginal Economic Policy Research, The Australian National University.

Public Sector Mapping Agency (PSMA). (2012). *G-NAF Fact Sheet*. Retrieved from http://www.psma.com.au/products/documents/G-NAFFactsheet.pdf

Rubibi Community v Western Australia (2001) 114 FCR 523; [2001] FCA 1153

Rubibi Community v State of Western Australia (No 7) [2006] FCA 459

Snipp, M. C. (2004). American Indians and geographic mobility: Some parameters for public policy. In J. Taylor & M. Bell (Eds.), *Population mobility and Indigenous peoples in Australasia and North America* (pp. 184 - 201). London and New York: Routledge.

Taylor, J. (2009). Indigenous demography and public policy in Australia: Population or peoples? *Journal of Population Research, 26* (2), 115 – 130.

Taylor, J. (2011). Postcolonial transformation of the Australian Indigenous population. *Geographical Research. 49* (3), 286 – 300.

Thomas, E., Hedberg, O., Thompson. B., & Rajabifard, A. (2009). *A strategy framework to facilitate spatially enabled.* Victoria, Melbourne: Victorian Spatial Council.

United Nations. (2008). *United Nations Declaration on the Rights of Indigenous Peoples.* Retrieved from http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf

Yawuru Registered Native Title Body Corporate. (2012). *Walyjala-jala buru jayida jarringgun buru Nyamba Yawuru ngan-ga mirli mirli – Planning for the future: Yawuru cultural management plan*. Broome: Pindan Printing.

Yigitcanlar, T., Sipe, N., Evan, R., & Pitot, M. (2006). *The land use and public transport accessibility index model*. Paper presented to International Geographical Union 2006 Conference, Brisbane: Queensland University of Technology.

Yu, P. (2011). *The power of data in Aboriginal hands* (CAEPR Topical Issue 2012/4). Canberra: Centre for Aboriginal Economic Policy Research, The Australian National University. Retrieved from http://caepr.anu.edu.au/Publications/topical/2012TI4.php